

Abstract. *This paper focuses on the correlation between foreign exchange rate and a series of variables related to macro-financial economy at the level of the CEE countries. In the view of the financial crisis that brought forth a reaction of risk aversion among investors towards the emerging countries, it is questionable if foreign direct investments under the impact of the exchange rate dynamic are still playing a positive role in the catching up process. We develop an econometric approach based on the VECM methodology that conducts to the impulse-response functions highlighting the interactions between financial and real economy, with a special emphasis on the contributions of foreign direct investments on the dynamic of the variables that capture the state of the macroeconomic environment. The research concludes that foreign direct investments act as a catalyst for the economic growth, enabling the real economy to react positively to the impulses of the financial flows.*

Keywords: FDI, exchange rate, market capitalization, economic growth, financial markets.

THE COMPLEXITY OF FOREIGN EXCHANGE INTER-CONNECTIVITY WITH MACRO-FINANCIAL RELATED VARIABLES: ANALYTICAL PERSPECTIVE ON THE CEE MARKETS

Adrian Morar TRIANDAFIL

*University for Finance and Banking,
Bucharest, Romania*

*3, Negru Vodă, 3rd district, Bucharest,
Romania*

Email: consultantbancar@yahoo.com

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1. Introduction

Foreign Direct Investments (FDI) have recorded a consistent upward trend during the last 15 years in the CEE countries. Since financial inflows have been considered as supportive to macroeconomic stabilization, countries have resorted to various measures that aimed to render themselves more attractive in the eyes of foreign investors. The system of measures included the elimination of restrictions, the privatization of state-owned companies and the reduction of fiscal pressures as well as consistent subsidies. Meanwhile, the foreign direct investments generated important positive effects from the perspective of the employment increase and the extension of the range of products and services. Due to the propagation in chain of positive effects triggered by the foreign direct investments, there is a consistent literature on this topic; a special emphasis has been placed on the determinant factors that encourage the increase of foreign direct investments (Tomlin, 2000). Moreover, several studies conceived foreign direct investments not only as a receptor, but also as a trigger of other economic phenomena such as stock market development or budget deficit reduction (Klein and Rosengren, 2002).

Ever since 1983, Errunza revealed that foreign capital inflows exert an impact on stock market. Later, Yartey (2008) pointed out that foreign direct investment implies a consistent institutional and regulatory framework, convenient disclosure and listing requirements and fair trading policies, generating investors' confidence. The positive perception among investors determines the increase of the investor's base and participation, which attracts subsequently more capital inflows. Garcia and Liu (1999), Yartey and Adjasi (2007) have examined the relationship between foreign direct investments and other macroeconomic variables, highlighting the complexity of the interactions between variables. Singh (1997) identified a positive relationship between economic growth, stock market development and foreign direct investments. In line with the endogenous growth models (Romer, 1986, Grossman and Helpman, 1994, Lucas, 1998), Kiyota and Urata (2004) underlined that FDI complements domestic private investment and enhances technology transfer. In the light of these theories, foreign direct investments impact positively the economic growth through newer technology, improved human capital and infrastructure (Zhang, 2001, Baldwin et al., 2006). Aubin et al. (2008) brought forth the importance of foreign direct investments oriented towards technology transfers, spillovers and positive externalities through the multiplier effect. Nevertheless, Demekas et al. (2005) uncovered that emerging countries have a lower absorptive capacity of foreign direct investments in comparison with the developed countries since already advanced economic and production structures of the developed countries enable better results.

More recent studies brought forth the idea that foreign direct investments are associated with institutional and regulatory reform, adequate disclosure and fair trading practices, which generates more confidence in the market. Choong et al. (2005)

unveiled that developed financial systems are more likely to valorize the advantages implied by the foreign direct investments in the light of a better resource allocation and a reduction of information asymmetry (Zhao and Du, 2007). Durham (2004) set forth that a deep financial market will have a higher capacity to absorb the foreign direct investments. Bhandari et al. (2007) highlighted that a robust financial system enables the foreign direct investments to improve the efficiency of economic structures.

Other researches brought forth that foreign direct investments impact positively the productivity and economic growth, triggering a shift of the production frontier in the receptive country, with favorable implications on the GDP dynamic. Foreign direct investments have been revealed as an additional source of capital for the host countries, with a certain differentiation based on the economic development level. For instance, Vita and Kyaw (2009) unveiled that FDI has a positive effect on economic growth only in developing countries with lower middle and upper middle-income, but this is not the case for developing countries with a low-income. Constant and Yue (2010) set forth that foreign direct investments might lead to economic growth by an indirect effect: first, it stimulates the development of the financial system and second, this positive impact on the financial market could expand more on the real economy at the global level.

Literature unveiled that foreign direct investments are positively influenced by the state of the macroeconomic environment; a stable macroeconomic environment will attract more foreign direct investments in a country (Kose et al., 2009). This aspect might explain an interest of the policy makers for the improvement of the macroeconomic structures (i.e. institutional and fiscal framework, road infrastructures, absorption of the scientific and technological developments in the real economy, education) that are to facilitate the development of the foreign direct investments flows. Other researches highlighted that foreign direct investments have an important potential for the enhancements of the economic growth on short term while on long term the effect is totally opposite, which outlines the foreign direct investments under the form of a temporary stimulus (Dabla-Norris et al., 2010, Li Meng 2010).

This paper focuses on the correlation between foreign direct investments and financial economy at the level of the CEE countries. In comparison with previous studies that developed similar approaches at the level of the relationship between foreign direct investments and other macroeconomic variables (Wijeweera et al., 2010, Leitão, 2011, Sarkar, 2008), we propose a more integrated perspective, concentrated mainly on identifying the interactions between variables anchored in the financial economy and FDI; apart from that, the approach is multidimensional, considering the complexity of the empirical approach which reveals the peculiarities of the foreign direct investments in the CEE countries. The model grounds on financial variables pertaining to several CEE countries in order to reveal a regional perspective. Differences and similarities are

highlighted both at the global and individual level, positioning every country on the map of the international financial flows.

We develop an econometric approach based on the VECM methodology that conducts to the impulse-response functions highlighting the interactions between financial and real economy, with a special emphasis on the contributions of foreign direct investments on the dynamic of the variables that capture the state of the macroeconomic environment. In Section II we present the methodology that we valorize in order to highlight the complexity of the interdependent relationships between foreign exchange rate and macro-financial variables

2. Methodology

The methods that are valorized in order to analyze the time series consist of co-integration and impulse-response functions derived out of a Vector Error Correction Model.

The VECM model can be specified at the level of every country as:

$$\Delta X_t = \delta_0 + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \Gamma_3 \Delta X_{t-3} + \Gamma_4 \Delta X_{t-4} + \Gamma_5 \Delta X_{t-5} + \Gamma_6 \Delta X_{t-6} + \Gamma_7 \Delta X_{t-7} + \Gamma_8 \Delta X_{t-8} + \alpha \beta' X_{t-1} + \varepsilon_t$$

Where

$X_t = (\log(\text{FDI/GDP}), \log(\text{MK/GDP}), \log(\text{VAR_EXCH_RATE}), \log(\text{PROD}), \log(\text{R_GR}), \log(\text{DO}), \log(\text{I_R}), \log(\text{INFL}))$

FDI/GDP = The weight of foreign direct investments into the Gross Domestic Product

MK/GDP = The weight of market capitalization of listed companies into the Gross Domestic Product

VAR_EXCH_RATE = The quarterly dynamic of the exchange rate

PROD = The productivity computed as the ratio between added value and employment

R_GR = The real economic growth computed as the relative variation of real Gross Domestic Product

DO = The degree of openness of the economy computed as the ratio between the amount of exports and imports and the Gross Domestic Product

IR = The interest rate corresponding to the monetary policy

INFL = The inflation rate computed as the variation of the Price Consumption Index

$$\delta_0 = \Gamma_0 - \alpha \beta_0,$$

$$\varepsilon_t \sim N(0, \Omega)$$

Vector error correction model is concentrated on two key parameters such as α and β .

β matrix represents the cointegrating vector and incorporates long-term relationships between the endogenous variables.

α matrix reflects the dynamic adjustment of the endogenous variables to deviations from long-run equilibrium depicted by $\beta'x$.

The concept of co-integration techniques is helpful for the long-run relationships, and solves out the difficulty implied by non-stationarity. Cointegration methodology demands all the variables to be integrated of the same order; this determines the necessity for the variables to be subject to the unit roots test performed by the intermediary of the Augmented Dickey-Fuller and Philips-Perron approaches.

The data used in order to develop the model has been extracted from the Eurostat site (<http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>); this database ensures the comparability of the financial variables integrated in the model since similar definitions are used in order to ensure data consistency across the countries. The time period during which the variables are analyzed on a quarterly basis is 1998-2008.

3. Empirical approach and discussions

The first step in the empirical approach is represented by the unit root tests that aim at identifying the characteristics of the variables in terms of stationary. The variables are subject to the tests in levels and first differences. The statistic output reveals the fact that the variables are integrated of order one, highlighting the transitory dimension of shocks. This finding is consistent with previous works on the characteristics of the macroeconomic environment in CEE countries (Triandafil, Brezeanu, 2009). Since variables proved to be integrated of the same order, the next step in the analysis process is represented by the cointegration tests.

Based on the Akaike information criterion (AIC), we selected the lag length 4 for the estimation. Trace test and maximum eigenvalue test permit the rejection of the null hypothesis of no integration for both tests, which reveals a long-run relationship between variables. The statistic output corresponding to the co-integration test allows us to follow up the impulse-response functions in order to determine the special features of the variables' interactions, with a focus on the manner in which foreign direct investments are inter-related with the system of financial indicators (see Annex no.1 for the impulse-response functions).

First, analysis will conceive foreign direct investments as a trigger for the other variables. We assume that under the impact of important foreign direct investments, exchange rate is likely to fluctuate in the sense of a national currency appreciation. Moreover, capital market is likely to develop and to improve its liquidity and capitalization indicators under the impact of important financial flows. As for the relationship between foreign direct investments and exchange rate, Czech Republic reflects a quite positive impact during the whole period of analysis, meaning that

under the influence of important foreign direct investments, the exchange rate tends to reflect an appreciation of the national currency; this effect can be remarked at the level of the other countries as well, but what it differentiates this impact is precisely the period of time during which it is obvious.

In case of Hungary and Bulgaria, the effect is not exerted in a linear manner, but with slight modifications from one period to another.

If we had to divide the whole period into sub-periods, we would remark that during some periods of time the effect is positive while during other periods of time, the effect is negative.

In case of Poland and Romania, the negative impact is continuously exerted during the whole period of time. An analysis at the level of the standard deviation relative to the exchange rate permits us to construe this permanent negative effect. The fluctuation of the exchange rate is the highest in case of Romania and Poland, suggesting that in these countries the volatility of the exchange rate was due to severe macroeconomic disequilibria during this period of time; in fact, despite the high level of foreign direct investments, the structural disequilibria reflected in the exchange rate fluctuation was not compensated.

As for the impact exerted by foreign direct investments on the weight of market capitalization of listed companies into GDP, we remark that in case of Bulgaria and Romania, the impact is consistently positive, meaning that financial inflows supported to a high extent the development of capital market; in other countries, such as Czech Republic, Hungary and Poland, the impact is not significant. One interesting aspect consists of the fact that precisely in the countries where the capital market is developed (aspect demonstrated by the highest weight of market capitalization into the Gross Domestic Product) such as Hungary, Czech Republic and Poland, the impact is not significant. This finding is supported by the evidence that capital market has evolved under the impact of other factors in these countries (Jonas, 2006) so that foreign direct investments influence is of low importance.

The productivity is positively impacted by foreign direct investments in case of all countries, uncovering that the attraction of foreign direct investments, due to the technology transfer, can lead to important gains, most of them generated by the scale economies. With few exceptions (Hungary and Czech Republic), foreign direct investments contribute negatively to inflation, confirming the theories that assume the increase of macroeconomic stability under the impact of foreign financial flows (Aubin et al., 2008).

Switching the analysis to the foreign direct investments as a receptor of the effects exerted by the other variables, we remark a higher degree of heterogeneity at the country level. In case of Romania, the foreign direct investments react to exchange rate, but only in the negative direction, meaning that it recorded a decrease trend under the influence of the exchange rate fluctuation.

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We can appreciate that the high level of volatility recorded by the exchange rate determined a certain reluctance of foreign investors in respect of de-locating their operations in this country.

The same negative effect is remarked in case of Bulgaria and Poland. In fact, in case of Bulgaria, the dynamic is significantly non-linear; there are short periods of time when the foreign direct investments reaction to exchange rate impulse is positive, but this dynamic is followed up by a different reaction.

The most complex dynamic is recorded in case of Czech Republic; foreign direct investments react to the impulse of the exchange rate in a significantly positive manner, despite the fact that in the beginning of the analyzed time-period, the impact was negative. Regarding the standard deviation corresponding to the exchange rate, Czech Republic did not register a high fluctuation at the level of the exchange rate, which explains its positive impact on the foreign direct investments. Since exchange rate did not record significant volatility, a quite stable national currency can act as a driver of foreign direct investments.

As for the impact exerted by capital market on foreign direct investments, we find that this impact is of a positive nature especially in case of Hungary and Romania. In these countries, the degree of capital market development is the lowest in the CEE region. In case of Poland which registers the highest weight of market capitalization into GDP, the impact is quite weak. These findings are in opposition with our initial assumptions that presumed a real impact of capital market on foreign direct investments in the countries where capital market is strongly developed. Focusing on the manner in which capital market development is inter-related with the other variables, we remark that in case of Hungary and Poland, it reacted in a significant manner to the impulses of exchange rate while in case of Romania, Czech Republic and Bulgaria, the reaction was of a lower intensity.

The productivity and interest rate impact negatively the foreign direct investments in case of Romania and Bulgaria, in line with the conclusions of Levasseur (2006) who revealed the low absorptive capacity of foreign direct investments in case of countries with low levels of productivity and underdeveloped financial systems. The same negative influences are remarked in case of inflation and interest rate. In essence, the macroeconomic imbalances that occurred in the CEE countries were generated by the high inflation rate, which acted as a hindrance of foreign investments; investors' perception on the reliability of a country to generate a beneficial environment for the valorization of their investments is highly impacted by the dynamic of the inflation rate. A high inflation rate reflects important structural weakness, endangering the macroeconomic stability and the potential investors' returns. The inflation exerts a similar effect in case of Czech Republic and Poland. In opposition, the inflation rate has a positive impact on foreign direct investments in case of Hungary, confirming the theories according to which a high inflation rate triggers the depreciation of the national currency, encouraging foreign investors to

orient their capital flows based on the rationale that in future there might be an opportunity for effective appreciation (Lensink and Morrissey, 2006).

The real economic growth exerts a negative impact on foreign direct investments only in case of Czech Republic while the impact is positive as for the other countries, in line with the most part of the researches which unveiled that economic growth acts as an incentive for foreign direct investments, motivating the investors to direct their capital towards a growing region, with a high potential of reward (Hansen and Rand, 2006).

As for capital market reaction under the impact of foreign direct investments, the findings are really interesting; in all cases, the weight of market capitalization of listed companies into GDP react in a consistent manner under the impact of foreign direct investments.

4. Conclusions

This paper focuses on the correlation between foreign direct investments and financial economy at the level of the CEE countries. In the view of the financial crisis that brought forth a reaction of risk aversion among investors towards the emerging countries, it is questionable if foreign direct investments are still playing a positive role in the catching up process. We develop an econometric approach based on the VECM methodology that conducts to the impulse-response functions highlighting the interactions between financial and real economy, with a special emphasis on the contributions of foreign direct investments on the dynamic of the variables that capture the state of the macroeconomic environment. The statistic output revealed that variables are integrated of order one, highlighting the transitory dimension of shocks. This finding permitted the co-integration tests which revealed important findings. The analysis focused on foreign direct investments both in the position of determinant factor for the dynamic of the other macroeconomic indicators, as well as in the position of a receptor of the effects exerted by the other variables.

The analysis permitted us to remark a higher degree of heterogeneity at the country level. As such, Czech Republic reflects a quite positive impact during the whole period of analysis, meaning that under the influence of important foreign direct investments, the exchange rate tends to reflect an appreciation of the national currency; this effect can be remarked at the level of the other countries as well, but what it differentiates this impact is precisely the period of time during which it is obvious. In case of Hungary and Bulgaria, the effect is not exerted in a linear manner, but with slight modifications from one period to another.

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The findings of this paper must be interpreted in the context of the limitations imposed by the CEE area peculiarities in terms of macroeconomic environment.

Further research will concentrate on the enlargement of the database at the level of the variables that are integrated as well as at the level of the time-period the analysis is conducted on.

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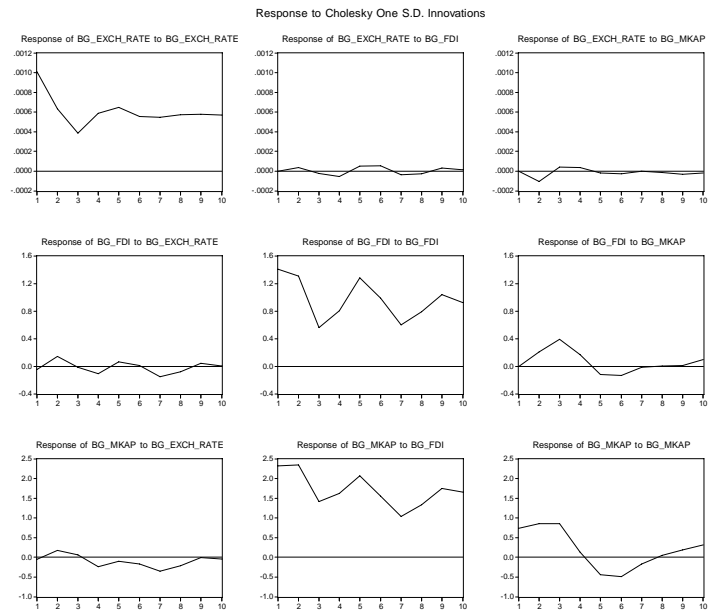
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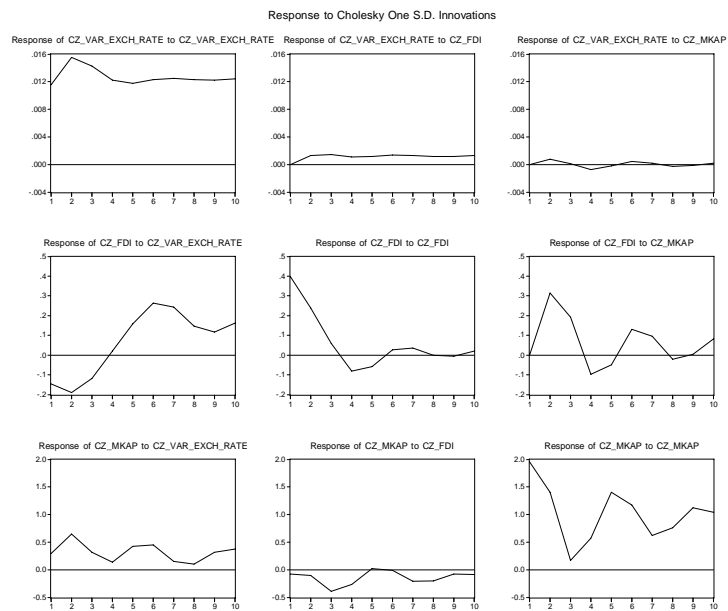
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Appendices

Bulgaria

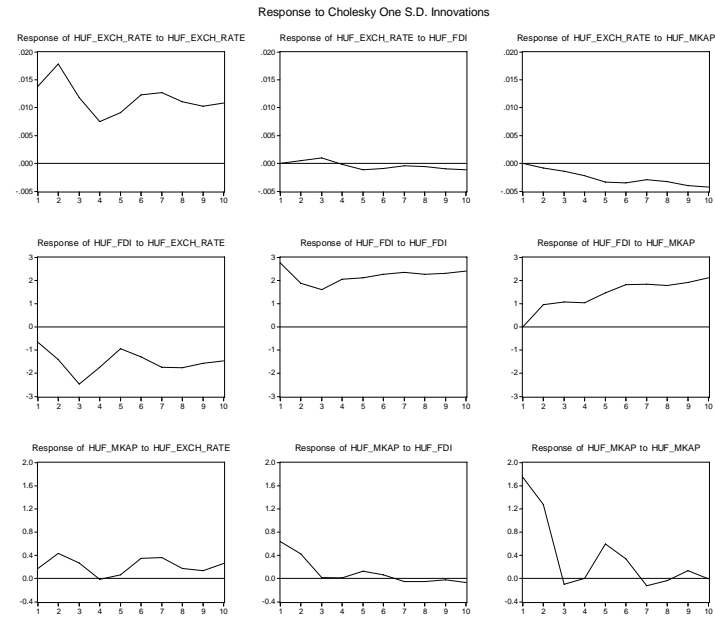


Czech Republic

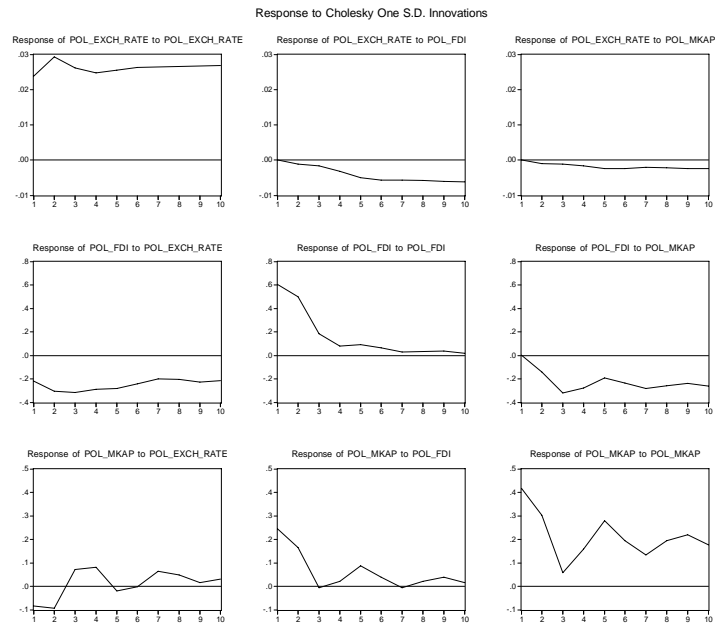


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Hungary



Poland



Romania

